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EXAMINER	
LEUNG, JENNIFER A	

ART UNIT	PAPER NUMBER
1764	

DATE MAILED: 05/31/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/035,788	PECK, BILL J.	
	Examiner	Art Unit	
	Jennifer A. Leung	1764	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 17 February 2006. and 20 March 2006.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-21,40-56 and 59-62 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-21,40-56 and 59-62 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on March 20, 2006 has been entered.

Response to Amendment

2. Applicant's amendment submitted on February 17, 2006 has been received and carefully considered. The changes made to the specification are acceptable. Claims 22-39, 57 and 58 are canceled. Claims 1-21, 40-56 and 59-62 are under consideration.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. Claims 1-3, 5, 7, 9, 10, 12-20 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wagener et al. (US 6,251,195) in view of Sharma et al. (US 5,195,888) and Narayanswami et al. (US 5,810,942).

Regarding claim 1, Wagener et al. (FIG. 1; column 5, line 39 to column 7, line 64) discloses an apparatus comprising a chamber (i.e., process chamber **12**) comprising an opening (i.e., chamber valve **28**) in a wall; a device (i.e., nozzle **20**) dispensing reagents on a support (i.e., wafer **18**), at least a portion of device **20** being within chamber **12**; and a mechanism (i.e., transfer robot **50**) moving support **18** into and out of chamber **12** through opening **28** and for

positioning support **18** relative to device **20**. Wagener et al. (column 9, line 22 to column 10, line 28) further discloses an element (i.e., diffuser **32**) diffusing gas within compartment **12**, wherein, "diffuser **32** is used to create... an evenly distributed flow **30** of gas, referred to as a "curtain flow" of gas," (column 9, lines 48-50). Wagener et al., however, is silent as to diffuser **32** comprising a manifold including at least two compartments, wherein each compartment is in fluid communication with a respective gas inlet and wherein a perforated element is in fluid communication with said manifold and substantially perpendicular to the gas inlets.

Sharma et al. (FIG. 1; column 3, line 57 to column 5, line 40) teaches an apparatus for dispersing a multi-layer fluid curtain, the apparatus comprising a manifold including at least two compartments (i.e., a dual diffuser comprising a first compartment defined by inner diffuser **16** and a second compartment defined by outer diffuser **22**), wherein each of compartments **16** and **22** is in fluid communication with a respective gas inlet **18** and **24**; a perforated element is in fluid communication with said manifold (i.e., each of emitting areas **20** and **26** comprising an "opening covered by a porous, permeable or perforated surface," column 4, lines 17-33 and 47-66); and the perforated element is substantially perpendicular to the gas inlets **18** and **24** (i.e., emitting area **26** is perpendicular to inlet **24** in FIG. 1; also, emitting area **20** may be, "oriented to emit the inner layer of fluid parallel to the furnace opening **10**," thereby suggesting that the element may also be configured perpendicular to the gas inlet **18**; column 4, lines 34-40).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to substitute the apparatus for dispersing gas of Sharma et al. for the diffuser **32** in the apparatus of Wagener et al., on the basis of suitability for the intended use, because the fluid curtain as emitted by the apparatus of Sharma et al. possesses two layers that act cooperatively to

stabilize the laminar flow in each layer over a longer distance, thereby extending the effective area of coverage of the layers (column 2, lines 41-50). Also, the substitution of known equivalent structures involves only ordinary skill in the art. *In re Fout* 213 USPQ 532 (CCPA 1982); *In re Susi* 169 USPQ 423 (CCPA 1971); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *In re Ruff* 118 USPQ 343 (CCPA 1958).

In view of the newly added limitations, Wagener et al. further discloses a gas outlet (i.e., leading to vacuum pump **40**; FIG. 1) in a wall of chamber **12**. Wagener et al., however, is silent as to the gas outlet being located in a chamber **12** wall that is perpendicular to the gas inlets.

In any event, it would have been obvious for one of ordinary skill in the art at the time the invention was made to shift the location of the gas outlet, with respect to the gas inlets, according to the instantly claimed configuration in the modified apparatus of Wagener et al., on the basis of suitability for the intended use and absent showing any unexpected results thereof, because the shifting location of parts was held to have been obvious. *In re Japikse,* 181 F.2d 1019, 1023, 86 USPQ 70, 73 (CCPA 1950). This is evidenced by Wagener et al., who discloses that, "Diffuser **32** can be positioned in a number of location within chamber **12** as may be desired for a particular application," (column 6, lines 34-36). Wagener et al. further cites a commonly assigned U.S. Patent No. 5,810,942 to Narayanswami et al. (see column 6, lines 43-46), wherein the gas outlet (i.e., at exhaust duct **20**) is positioned at a wall perpendicular to the gas flow, and hence, gas inlets (see FIG. 3, 4).

Regarding claims 2 and 3, the collective teaching of Wagener et al. and Sharma et al. is silent as to the perforated element comprising about 5 to about 200 perforation per square inch, about a 0.02 to about a 0.2 inch thickness, and perforation diameters of about 0.03 to about 0.25

inches. In any event, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select an appropriate number of perforations, thickness, and perforation diameter for the perforated element in the modified apparatus of Wagener et al., on the basis of suitability for the intended use and absent showing any unexpected results thereof, because where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller, 105 USPQ 233.*

Regarding claim 5, Wagener et al. discloses, "[d]iffuser **32** can be positioned in a number of locations within chamber **12** as may be desired for a particular application. In addition, diffuser **32** may be adjustably mounted within the chamber **12**." (column 6, lines 31-37). Thus, it would have been obvious for one of ordinary skill in the art at the time the invention was made to locate the perforated element opposite the opening **28** in the modified apparatus of Wegner et al., on the basis of suitability for the intended use. The shifting of location of parts merely involves routine skill in the art.

Regarding claims 7 and 40, device **20** for dispensing reagents **24** is a drop dispensing device (i.e., device **20** supplies an aerosol spray; column 5, lines 39-67), and mechanism **50** moves support **18** relative to drop dispensing device **20** (column 6, line 64 to column 7, line 24). The device **20** also comprises a pulse jet device, since the device is capable of supplying a jet of cryogenic particles. In any event, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select a known, suitable dispensing device for the device 20 in the modified apparatus of Wagener et al., on the basis of suitability for the intended use, because "... the design of such nozzles and other devices and controlling techniques are known... Any known or developed nozzle, supply or controlling circuits and mechanisms can be

utilized in accordance with the process chamber of the present invention." (column 5, lines 58-67). The Examiner takes Official Notice that the instantly claimed dispensing devices are conventionally known in the art.

Regarding claims 9, 18 and 19, Sharma et al. teaches three or more diffusers may be stacked to issue a curtain of three or more layers (column 2, lines 60-63; column 5, lines 32-35). Thus, it would have been obvious for one of ordinary skill in the art at the time the invention was made to provide at least four compartments in the modified apparatus of Wagener et al., on the basis of suitability for the intended use (e.g., for issuing a curtain of four or more layers). In addition, the duplication of part was held to have been obvious. St. Regis *Paper Co. v. Beemis Co. Inc.* 193 USPQ 8, 11 (1977); *In re Harza* 124 USPQ 378 (CCPA 1960). In the case of the apparatus having at least four compartments, the apparatus would thus comprise at least four gas inlets (i.e., similar to gas inlets **18** and **24**; see FIG. 1), wherein each of said gas inlets comprises a valve (i.e., similar to the means **19** and **25** for controlling the fluid flow; see FIG. 1).

Regarding claim 10, the chamber **12** of Wagener has a vertical symmetry (see FIG. 1).

Regarding claims 12 and 13, Wagener et al. (FIG. 1; column 6, line 64 to column 7, line 24) discloses a controller for controlling the movement of mechanism **50** for moving support **18** (i.e., the "robot" will comprise control means, for controlling the disclosed X-Y directional movements or Z-direction movement), wherein said mechanism **50** is a robotic arm (see FIG. 3).

Regarding claims 14 and 15, Wagener (FIG. 1-4; column 8, lines 51-65) discloses opening **28** comprises a door (i.e., closed in FIG. 2,4; open in FIG. 3), wherein the dimensions of said door are sufficient to permit ingress and egress of a mechanism **50** (see FIG. 3).

Regarding claim 16, although Wagener (FIG. 1) is silent as to the dimensions of door **28**

being sufficient to permit ingress and egress of device **20**, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select appropriate dimensions for said door **28** in the modified apparatus of Wagener et al., on the basis of suitability for the intended use thereof, because it has been held that changes in size involve only ordinary skill in the art. *In re Rose*, 220 F.2d 459, 463, 105 USPQ 237, 240 (CCPA 1955).

Regarding claim 17, door **28** is in a wall of chamber **12** opposite to an outlet element (i.e., an opening for evacuating chamber **12** with pump **40**; column 6, lines 47-63; FIG. 1).

Regarding claim 20, it appears that the modified apparatus of Wagener structurally meets the claims, as the pressure at which the gas is introduced through the manifold is considered a process limitation, and the structural design of the gas inlets appears no different from the gas inlets as disclosed by Applicants. Thus, the gas inlets in the modified apparatus of Wagener would be inherently capable of supplying the gas at the desired pressure.

4. Claims 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wagener et al. (US 6,251,195) in view of Sharma et al. (US 5,195,888) and Narayanswami et al. (US 5,810,942), as applied to claim 1 above, and further in view of Vogel (US 5,590,537).

The collective teaching of Wagener, Sharma and Narayanswami is silent as to the perforated element being about 0.02 to about 2 inches thick. In any event, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select the claimed thickness for the perforated element in the modified apparatus of Wagener et al., on the basis of suitability for the intended use and absent showing any unexpected results thereof, because it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller,*

105 USPQ 233. Also, changes in size merely involves ordinary skill in the art. In addition, the collective teaching of Wagener, Sharma and Narayanswami is silent as to the apparatus comprising a honeycomb element in fluid communication with said perforated element. Vogel (column 3, lines 20-42; FIG. 1) teaches an apparatus for dispersing a gas as a fluid curtain, said apparatus comprising a honeycomb element **30**. It would have been obvious for one of ordinary skill in the art at the time the invention was made to provide the honeycomb element of Vogel to the modified apparatus of Wagener et al., on the basis of suitability for the intended use, because the honeycomb element ensures that the fluid curtain flows in a laminar and parallel fashion, as taught by Vogel.

5. Claims 6 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wagener et al. (US 6,251,195) in view of Sharma et al. (US 5,195,888) and Narayanswami et al. (US 5,810,942), as applied to claim 1 above, and further in view of Yamamoto (JP 63-296845).

Wagener is silent as to the walls of chamber **12** leading to the wall with opening **28** being tapered, or the angles in the interior of chamber **12** being beveled. Yamamoto (FIG. 4, third illustration) teaches a chamber comprising a tapered wall **14** leading to a wall comprising an opening **13**, the tapered wall **14** defining a beveled angle. It would have been obvious for one of ordinary skill in the art at the time the invention was made to provide tapered walls or beveled angles in the chamber of the modified apparatus of Wagener et al., on the basis of suitability for the intended use, because the tapered walls or beveled angles guide the flow of fluid from the interior of the chamber to the chamber outlet, as evidenced by Yamamoto.

6. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wagener et al. (US 6,251,195) in view of Sharma et al. (US 5,195,888) and Narayanswami et al. (US 5,810,942), as

applied to claim 1 above, and further in view of Moriya et al. (US 4,650,698).

The collective teaching of Wagener, Sharma and Narayanswami is silent as to the gas inlets each comprising a separate T-junction, such that gas enters each of the gas inlets in a direction that is substantially normal to the direction in which gas exits the manifold. In any event, it would have been obvious for one of ordinary skill in the art at the time the invention was made to provide such a configuration for the gas inlets in the modified apparatus of Wagener et al., on the basis of suitability for the intended use thereof, because the provision of a T-junction at a gas inlet is conventionally known in the art of fluid distribution for enabling the supply of multiple gases to a single gas inlet, as evidenced by Moriya et al. (i.e., for the supply of a plurality of gases **3**, **4**, **5** and **6** via a single gas inlet; see FIG. 1).

7. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wagener et al. (US 6,251,195) in view of Sharma et al. (US 5,195,888) and Narayanswami et al. (US 5,810,942), as applied to claim 1 above, and further in view of Philipossian (US 5,064,367).

The collective teaching of Wagener, Sharma and Narayanswami is silent as to each compartment comprising an element for diffusing gas within the compartment. Philipossian (FIG. 9, 10; column 5, line 5 to column 6, line 25) teaches a compartment (i.e., tube **10**) comprising a diffusing element (i.e., as defined by filler **45**, or insert **46**). It would have been obvious for one of ordinary skill in the art at the time the invention was made to provide a diffusing element within the compartments in the modified apparatus of Wagener, on the basis of suitability for the intended use, because the diffusing elements produce a conical nozzle that supplies a gas flow at faster velocities, following the flow streamlines, and avoids or minimizes recirculating gas cells. The amount of gas used in purging a tube with this configuration is

reduced, and the time need for thorough purging is also reduced," as taught by Philipossian (Abstract).

8. Claims 41, 43, 45-48 and 50-52 rejected under 35 U.S.C. 103(a) as being unpatentable over Wagener et al. (US 6,251,195) in view of Sharma et al. (US 5,195,888), Powers (US 5,965,048) and Moriya et al. (US 4,650,698).

Regarding claim 41, Wagener (FIG. 1; column 5, line 39 to column 7, line 64) discloses an apparatus comprising a chamber (i.e., process chamber **12**) comprising an opening (i.e., chamber valve **28**) in a wall; a device (i.e., nozzle **20**) dispensing reagents on a support (i.e., wafer **18**), at least a portion of device **20** being within chamber **12**; and a mechanism (i.e., transfer robot **50**) moving support **18** into and out of chamber **12** through opening **28** and positioning support **18** relative to device **20**. Wagener (column 9, line 22 to column 10, line 28) further discloses an element (i.e., diffuser **32**) for diffusing gas within said compartment **12**, wherein the "diffuser **32** is used to create... an evenly distributed flow **30** of gas, referred to as a "curtain flow" of gas," (column 9, lines 48-50). Wagener, however, is silent as to diffuser **32** comprising a manifold including at least two compartments, wherein each compartment is in fluid communication with a respective gas inlet, and a perforated element is in fluid communication with said manifold.

Sharma et al. (FIG. 1; column 3, line 57 to column 5, line 40) teaches an apparatus for dispersing a multi-layer fluid curtain, the apparatus comprising a manifold including at least two compartments (i.e., a dual diffuser comprising a first compartment defined by inner diffuser **16** and a second compartment defined by outer diffuser **22**), wherein each of compartments **16** and **22** is in fluid communication with a respective gas inlet **18** and **24**, and a perforated element is in

fluid communication with said manifold (i.e., emitting areas **20** and **26** comprise an "opening covered by a porous, permeable or perforated surface," column 4, lines 17-33 and 47-66).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to substitute the apparatus for dispersing gas of Sharma et al. for the diffuser **32** in the apparatus of Wagener et al., on the basis of suitability for the intended use, because the fluid curtain as emitted by the apparatus of Sharma et al. possesses two layers that act cooperatively to stabilize the laminar flow in each layer over a longer distance, thereby extending the effective area of coverage of the layers (column 2, lines 41-50). Also, the substitution of known equivalent structures involves only ordinary skill in the art. *In re Fout* 213 USPQ 532 (CCPA 1982); *In re Susi* 169 USPQ 423 (CCPA 1971); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *In re Ruff* 118 USPQ 343 (CCPA 1958).

The collective teachings of Wagener et al. and Sharma et al. is silent as to each gas inlet being in fluid communication with a gas inlet source that is oriented to provide gas in a direction that is substantially normal to the direction in which the gas flows through the gas inlet and enters the manifold. Powers teaches an apparatus comprising plural gas inlets (i.e., openings **64**; see FIG. 5), wherein each gas inlet **64** is in fluid communication with a gas inlet source that is oriented to provide gas in a direction that is substantially normal to the direction in which the gas flows through the gas inlet and into the diffuser (i.e., via conduit **44**, which directs the gas flow in a direction normal to the flow of gas through gas inlets **64**; see FIG. 2). It would have been obvious for one of ordinary skill in the art at the time the invention was made to configure the gas inlets as instantly claimed because the configuration allows plural gas inlets to be fed by a single gas source, as taught by Powers.

In view of the newly added limitation, the collective teachings of Wagener, Sharma and Powers is silent as to the gas being provided from two directions, such that the gas from each direction collides and enters the gas inlet in a direction that is substantially normal to the direction in which the gas flows through the gas inlets and enters the manifold. In any event, it would have been obvious for one of ordinary skill in the art at the time the invention was made to provide such a configuration for the gas inlets in the modified apparatus of Wagener et al., on the basis of suitability for the intended use thereof, because the provision of a T-junction at a gas inlet is conventionally known in the art of fluid distribution for enabling the supply of multiple gases to a single gas inlet, as evidenced by Moriya et al. (i.e., for the supply of a plurality of gases **3**, **4**, **5** and **6** via a single gas inlet; see FIG. 1).

Regarding claim 43, Wagener et al. discloses that, "[d]iffuser **32** can be positioned in a number of locations within chamber **12** as may be desired for a particular application. In addition, diffuser **32** may be adjustably mounted within the chamber **12**." (column 6, lines 31-37). Thus, it would have been obvious for one of ordinary skill in the art at the time the invention was made to locate the perforated element opposite the opening **28** in the modified apparatus of Wegner et al. on the basis of suitability for the intended use. Furthermore, it has been held that the shifting of location of parts merely involves routine skill in the art.

Regarding claims 45-47, Wagener et al. discloses said device **20** for dispensing reagents **24** is a drop dispensing device (i.e., device **20** supplies a cryogenic aerosol spray; column 5, lines 39-67), and said mechanism **50** is a mechanism for moving a support **18** relative to said drop dispensing device **20** (column 6, line 64 to column 7, line 24). The device **20** also comprises a pulse jet device, since the device is capable of supplying a jet of frozen cryogenic particles. In

any event, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select a known, suitable dispensing device for the device **20** in the modified apparatus of Wagener et al., on the basis of suitability for the intended use, because "... the design of such nozzles and other devices and controlling techniques are known... Any known or developed nozzle, supply or controlling circuits and mechanisms can be utilized in accordance with the process chamber of the present invention." (column 5, lines 58-67). The Examiner takes Official Notice that the instantly claimed dispensing devices are conventionally known in the art.

Regarding claim 48, the chamber **12** of Wagener has a vertical symmetry (see FIG. 1).

Regarding claim 50, Wagener et al. (FIG. 1; column 6, line 64 to column 7, line 24) further discloses a controller for controlling the movement of said mechanism **50** for moving said support **18** (by definition, a "robot" will comprise some sort of control means; e.g., for controlling the disclosed X-Y directional movements or Z-direction movement), wherein said mechanism **50** is a robotic arm (see FIG. 3).

Regarding claim 51, Wagener et al. (FIG. 1-4; column 8, lines 51-65) discloses opening **28** comprises a door (i.e., door closed in FIG. 2, 4; door open in FIG. 3), wherein the dimensions of said door are sufficient to permit ingress and egress of mechanism **50** (see FIG. 3).

Regarding claim 52, Wagener discloses, "[d]iffuser **32** can be positioned in a number of locations within chamber **12** as may be desired for a particular application. In addition, diffuser **32** may be adjustably mounted within the chamber **12**." (column 6, lines 31-37). Thus, it would have been obvious for one of ordinary skill in the art at the time the invention was made to locate the perforated element opposite the opening **28** in the modified apparatus of Wegner. Also, the shifting of location of parts involves routine skill in the art.

9. Claim 42 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wagener et al. (US 6,251,195) in view of Sharma et al. (US 5,195,888), Powers (US 5,965,048) and Moriya et al. (US 4,650,698), as applied to claim 41 above, and further in view of Vogel (US 5,590,537).

The collective teaching of Wagener, Sharma, Powers and Moriya is silent as to the apparatus comprising a honeycomb element in fluid communication with said perforated element. Vogel (column 3, lines 20-42; FIG. 1) teaches an apparatus for dispersing a fluid curtain, comprising a honeycomb element **30**. It would have been obvious for one of ordinary skill in the art at the time the invention was made to provide the honeycomb element of Vogel to the modified apparatus of Wagener, on the basis of suitability for the intended use, because the honeycomb element ensures that the fluid curtain flows in a laminar and parallel fashion, as taught by Vogel.

10. Claims 44 and 49 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wagener et al. (US 6,251,195) in view of Sharma et al. (US 5,195,888), Powers (US 5,965,048) and Moriya et al. (US 4,650,698), as applied to claims 41 and 43 above, and further in view of Yamamoto (JP 63-296845).

Wagener is silent as to the walls of chamber **12** leading to opening **28** being tapered, or the angles in the interior being beveled. Yamamoto (FIG. 4, third illustration) teaches a chamber comprising a tapered wall **14** leading to a wall comprising an opening **13**, the tapered wall **14** defining a beveled angle in the interior of said chamber. It would have been obvious for one of ordinary skill in the art at the time the invention was made to provide tapered walls or beveled angles in the chamber of the modified apparatus of Wagener et al., on the basis of suitability for the intended use, because the tapered walls or beveled angles would help guide the flow of fluid

from the interior of the chamber to the chamber outlet, as evidenced by Yamamoto.

11. Claim 53 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wagener et al. (US 6,251,195) in view of Sharma et al. (US 5,195,888), Powers (US 5,965,048) and Moriya et al. (US 4,650,698), as applied to claim 41 above, and further in view of Philipossian (US 5,064,367).

The collective teaching of Wagener, Sharma, Powers and Moriya is silent as to each compartment comprising an element for diffusing gas within the compartment. Philipossian (FIG. 9, 10; column 5, line 5 to column 6, line 25) teaches a compartment (i.e., tube **10**) comprising a diffusing element (i.e., defined by filler **45**, or insert **46**). It would have been obvious for one of ordinary skill in the art at the time the invention was made to provide a diffusing element within the compartments in the modified apparatus of Wagener, on the basis of suitability for the intended use, because the diffusing elements produce a conical nozzle that supplies a gas flow at faster velocities, following the flow streamlines, and avoids or minimizes recirculating gas cells. The amount of gas used in purging a tube with this configuration is reduced, and the time need for thorough purging is also reduced," as taught by Philipossian (Abstract).

12. Claims 54, 55 and 59-62 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wagener et al. (US 6,251,195) in view of Sharma et al. (US 5,195,888) and Philipossian (US 5,064,367).

Regarding claim 54, Wagener FIG. 1; column 5, line 39 to column 7, line 64) discloses an apparatus comprising a chamber (i.e., process chamber **12**) comprising an opening (i.e., chamber valve **28**) in a wall; a device (i.e., nozzle **20**) dispensing reagents on a support (i.e.,

wafer **18**), at least a portion of device **20** being within chamber **12**; and a mechanism (i.e., transfer robot **50**) moving support **18** into and out of chamber **12** through opening **28** and positioning support **18** relative to device **20**. Wagener (column 9, line 22 to column 10, line 28) further discloses an element (i.e., diffuser **32**) for diffusing gas within said compartment **12**, wherein the "diffuser **32** is used to create... an evenly distributed flow **30** of gas, referred to as a "curtain flow" of gas," (column 9, lines 48-50).

Wagener is silent as to diffuser **32** comprising a manifold including at least two compartments, wherein each compartment is in fluid communication with a respective gas inlet, and wherein a perforated element is in fluid communication with said manifold. Sharma (FIG. 1; column 3, line 57 to column 5, line 40) teaches an apparatus for dispersing a fluid curtain, the apparatus comprising a manifold including at least two compartments (i.e., a dual diffuser comprising a first compartment defined by inner diffuser **16** and a second compartment defined by outer diffuser **22**), wherein each of compartments **16** and **22** is in fluid communication with a respective gas inlet **18** and **24**, and a perforated element is in fluid communication with said manifold (i.e., emitting areas **20** and **26** comprising an "opening covered by a porous, permeable or perforated surface," column 4, lines 17-33 and 47-66). It would have been obvious for one of ordinary skill in the art at the time the invention was made to substitute the apparatus for dispersing gas of Sharma for the diffuser **32** in the apparatus of Wagener et al., on the basis of suitability for the intended use, because the fluid curtain as emitted by the apparatus of Sharma et al. possesses two layers that act cooperatively to stabilize the laminar flow in each layer over a longer distance, thereby extending the effective area of coverage of the layers (column 2, lines 41-50). Also, the substitution of known equivalent structures involves only ordinary skill in the

art. *In re Fout* 213 USPQ 532 (CCPA 1982); *In re Susi* 169 USPQ 423 (CCPA 1971); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *In re Ruff* 118 USPQ 343 (CCPA 1958).

The collective teaching of Wagener et al. and Sharma et al. is silent as to each of said compartments comprising raised surfaces within the compartments. Philipossian (FIG. 9, 10; column 5, line 5 to column 6, line 25) teaches a compartment (i.e., tube 10) comprising raised surfaces (i.e., as defined by filler **45**, or insert **46**). It would have been obvious for one of ordinary skill in the art at the time the invention was made to provide raised surfaces within the compartments in the modified apparatus of Wagener, on the basis of suitability for the intended use, because the raised surfaces produce a conical nozzle that supplies a gas flow at faster velocities, following the flow streamlines, and avoids or minimizes recirculating gas cells. The amount of gas used in purging a tube with this configuration is reduced, and the time need for thorough purging is also reduced," as taught by Philipossian (Abstract).

In view of the newly added limitation, the modified apparatus of Wagener et al. structurally meets the claim of a "pulse jet device", given that the device comprises a jet impingement nozzle **20** capable of being controlled to emit a jet of frozen cryogenic particles (see column 5, lines 43-67). Operation of the nozzle **20** in a pulsing manner is considered a process limitation. A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim.

Regarding claim 55, the chamber **12** has vertical symmetry (see FIG).

Regarding claims 59, the device **20** comprises a plurality of nozzles (i.e., a plurality of

orifices, not shown; see column 5, lines 45-47).

Regarding claim 60, Wagener et al. (FIG. 1; column 6, line 64 to column 7, line 24) further discloses a controller for controlling the movement of said mechanism **50** for moving said support **18** (by definition, a "robot" will comprise some sort of control means; e.g., for controlling the disclosed X-Y directional movements or Z-direction movement), wherein said mechanism **50** is a robotic arm (see FIG. 3).

Regarding claim 61, Wagener et al. discloses that, "[d]iffuser **32** can be positioned in a number of locations within chamber **12** as may be desired for a particular application. In addition, diffuser **32** may be adjustably mounted within the chamber **12**." (column 6, lines 31-37). Thus, it would have been obvious for one of ordinary skill in the art at the time the invention was made to locate the perforated element opposite the opening **28** in the modified apparatus of Wegner et al. on the basis of suitability for the intended use. Furthermore, it has been held that the shifting of location of parts merely involves routine skill in the art.

Regarding claim 62, Sharma et al. teaches that three or more diffusers may be stacked to issue a curtain of three or more layers (column 2, lines 60-63; column 5, lines 32-35). Thus, it would have been obvious for one of ordinary skill in the art at the time the invention was made to provide at least four compartments to the manifold in the modified apparatus of Wagener et al., on the basis of suitability for the intended use (e.g., for issuing a curtain of four or more layers). In addition, the duplication of part was held to have been obvious. St. Regis *Paper Co. v. Beemis Co. Inc.* 193 USPQ 8, 11 (1977); *In re Harza* 124 USPQ 378 (CCPA 1960).

13. Claim 56 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wagener et al. (US 6,251,195) in view of Sharma et al. (US 5,195,888) and Philipossian (US 5,064,367), as

applied to claim 54 above, and further in view of Vogel (US 5,590,537).

The collective teachings of Wagener, Sharma and Philipossian is silent as to the apparatus comprising a flow-straightening element in fluid communication with the perforated element. Vogel (column 3, lines 20-42; FIG. 1) teaches an apparatus for dispersing a gas as a fluid curtain, said apparatus comprising a flow-straightening element (i.e., honeycomb element **30**). It would have been obvious for one of ordinary skill in the art at the time the invention was made to provide the flow-straightening element of Vogel to the modified apparatus of Wagener et al., on the basis of suitability for the intended use, because the honeycomb element ensures that the fluid curtain flows in a laminar and parallel fashion, as taught by Vogel.

14. Claims 1-3, 5, 7, 9, 10, 12, 13, 18-20 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gamble et al. (US 5,981,733) in view of Sharma et al. (US 5,195,888).

Regarding claim 1, Gamble (FIG. 9, 10, 14; column 8, line 34 to column 10, line 37; column 11, line 62 to column 13, line 63) discloses an apparatus comprising a chamber (i.e., second section **104**; FIG. 9) in fluid communication with a gas outlet port **194**; chamber **104** comprising an opening in a wall thereof (i.e., slot **140**; FIG. 10); a device for dispensing reagents (i.e., system **24**, with jetting device **46**; FIG. 9, 10), at least a portion of said device **46** being within chamber **104**; and a mechanism (i.e., positioning system **30**, with rotational support rod **106**; column 8, lines 52-59) for moving a support (i.e., substrate **20**) into and out of said chamber **104** through said opening **140** and for positioning the support **20** relative to said device for dispensing reagents **24**. Gamble is silent as to outlet port **194** comprising a manifold including at least two compartments, wherein each of said compartments is in fluid communication with a respective gas inlet, wherein a perforated element in fluid communication with said manifold,

and wherein said perforated element is substantially perpendicular to the gas inlets.

Sharma (FIG. 1; column 3, line 57 to column 5, line 40) teaches an apparatus dispersing a multi-layer fluid curtain, the apparatus comprising a manifold including two compartments (i.e., a dual diffuser comprising a first compartment defined by inner diffuser **16** and a second compartment defined by outer diffuser **22**), wherein each of compartments **16** and **22** is in fluid communication with a respective gas inlet **18** and **24**, and wherein a perforated element is in fluid communication with said manifold (i.e., emitting areas **20** and **26** comprising an "opening covered by a porous, permeable or perforated surface," column 4, lines 17-33 and 47-66) and substantially perpendicular to the gas inlets **18** and **24** (i.e., emitting area **26** and its corresponding perforated element is perpendicular to inlet **24** in FIG. 1; also, emitting area **20** and its corresponding perforated element may be, "oriented to emit the inner layer of fluid parallel to the furnace opening **10**," thereby suggesting that the perforated element may be configured perpendicular to the gas inlet **18**; column 4, lines 34-40).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to substitute the apparatus for dispersing gas of Sharma for gas outlet port **194** in the apparatus of Gamble, on the basis of suitability for the intended use, because the fluid curtain as emitted by the apparatus of Sharma possesses two layers that act cooperatively to stabilize the laminar flow in each layer over a longer distance, thereby extending the effective area of coverage of the layers (column 2, lines 41-50). Also, substitution of known equivalent structures involves only ordinary skill in the art. *In re Fout* 213 USPQ 532 (CCPA 1982); *In re Susi* 169 USPQ 423 (CCPA 1971); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *In re Ruff* 118 USPQ 343 (CCPA 1958).

In view of the newly added limitation, Gamble discloses a gas outlet (i.e., an exit port **196** to the atmosphere; FIG. 14) in a wall of the chamber **104**. Gamble, however, is silent as to the gas outlet **196** being located in a chamber wall that is perpendicular to the gas inlets (i.e., gas from dry gas port **194** enters through opening **140** in the wall of the chamber). In any event, it would have been obvious for one of ordinary skill in the art at the time the invention was made to shift the location of the gas outlet, with respect to the gas inlets, according to the instantly claimed configuration in the modified apparatus of Gamble, on the basis of suitability for the intended use, because the shifting location of parts was held to have been obvious. *In re Japikse,* 181 F.2d 1019, 1023, 86 USPQ 70, 73 (CCPA 1950).

Regarding claims 2 and 3, the collective teaching of Gamble and Sharma is silent as to the perforated element comprising about 5 to about 200 perforation per square inch, about a 0.02 to about a 0.2 inch thickness, and perforation diameters of about 0.03 to about 0.25 inches. In any event, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select an appropriate number of perforations per square inch, thickness, and perforation diameter for the perforated element in the modified apparatus of Gamble, on the basis of suitability for the intended use and absent showing any unexpected results thereof, because where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller, 105 USPQ 233.*

Regarding claim 5, in the modified apparatus, opening **140** is in a wall of said chamber **104** opposite to the perforated element (i.e., located at the dry gas outlet port **194**).

Regarding claims 7 and 40, Gamble discloses a drop dispensing device (i.e., system **24** for dispensing spots of reagent; column 3, lines 35-43), and said mechanism (i.e., positioning

system **30**, with rotational support rod **106**; column 8, lines 52-59) is a mechanism for moving a support **20** relative to said device **24** (column 2, lines 14-16; column 4, lines 40-46).

Regarding claims 9, 18 and 19, Sharma teaches that three or more diffusers may be stacked to issue a curtain of three or more layers (column 2, lines 60-63; column 5, lines 32-35). Thus, it would have been obvious for one of ordinary skill in the art at the time the invention was made to provide at least four compartments to the manifold in the modified apparatus of Gamble, on the basis of suitability for the intended use (e.g., for issuing a curtain of four or more layers). In addition, the duplication of part was held to have been obvious. St. Regis *Paper Co. v. Beemis Co. Inc.* 193 USPQ 8, 11 (1977); *In re Harza* 124 USPQ 378 (CCPA 1960). In the case of the apparatus having at least four compartments, the apparatus would thus comprise at least four gas inlets (i.e., similar to gas inlets **18** and **24**; see FIG. 1), wherein each of said gas inlets comprises a valve (i.e., similar to the means **19** and **25** for controlling the fluid flow; see FIG. 1).

Regarding claim 10, Gamble discloses said chamber **104** has vertical symmetry (i.e., being that the chamber **104** comprises a square cross-section; see FIG. 9, 10).

Regarding claims 12 and 13, Gamble discloses a controller for controlling the movement of said mechanism for moving said support **20** (i.e., positioning system **30** comprises an X-Y stepper stage **108** and a rotational stepper **110**, driven by stepping motors **112a** and **112b**; column 8, line 52 to column 9, line 34; FIG. 9), wherein said mechanism is a robotic arm (i.e., the rotating support rod **106**, with substrate holder **22**).

Regarding claim 20, it appears that the modified apparatus of Gamble structurally meets the claims, as the pressure at which the gas is introduced through the manifold is considered a process limitation, and the structural design of the gas inlets appears no different from the gas

inlets as disclosed by Applicants. Thus, the gas inlets in the modified apparatus of Gamble would be inherently capable of supplying the gas at the desired pressures.

Response to Arguments

15. Applicant's arguments filed February 17, 2006 have been fully considered but they are not persuasive.

Wagener et al. in view of Sharma et al., and further secondary references

On page 11, third paragraph, Applicants argue,

> "... Sharma is concerned with furnaces such as a metal melting furnace... Although patentee indicates that the invention has many applications for providing a selected atmosphere within a contained volume, the disclosure of the reference does not extend beyond metal melting furnaces. One skilled in the art... would not look to Sharma for relevant information."

The Examiner respectfully disagrees. In response to Applicant's argument that Sharma et al. (who is concerned with providing a gas curtain to a furnace) is nonanalogous art to Wagener et al. (who is concerned with providing a gas curtain in a semiconductor processing chamber), it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). Although Sharma and Wagener utilize gas curtains in different applications, both Sharma and Wagener are concerned with the same problem of providing an evenly distributed flow of gas.

Applicant's arguments concerning the amendment to the claims, calling for the placement of "a gas outlet in a wall thereof that is perpendicular to the gas inlets," have been fully

considered, but are moot in view of the new ground(s) of rejection above.

Gamble et al. in view of Sharma et al., and further secondary references

On page 21, third paragraph, Applicants argue,

> "... Sharma is concerned with furnaces such as a metal melting furnace... Although patentee indicates that the invention has many applications for providing a selected atmosphere within a contained volume, the disclosure of the reference does not extend beyond metal melting furnaces. One skilled in the art... would not look to Sharma for relevant information."

The Examiner respectfully disagrees. In response to Applicant's argument that Sharma et al. (who is concerned with providing an inert atmosphere to a furnace) is nonanalogous art to Gamble et al. (who is concerned with providing an inert atmosphere in an apparatus for chemical synthesis), it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992).

Applicant's arguments concerning the amendment to the claims, calling for the placement of "a gas outlet in a wall thereof that is perpendicular to the gas inlets," have been fully considered, but are moot in view of the new ground(s) of rejection above.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer A. Leung whose telephone number is (571) 272-1449. The examiner can normally be reached on 9:30 am - 5:30 pm Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Glenn A. Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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